A BIBLIOGRAPHY OF AGRICULTURAL SCIENCE.[1]

THE yearly increasing output of scientific workers, like the fleas that have "lesser fleas to bite 'em," has called into being another class of workers who have to abstract the papers into Jahresberichte, Centralblatter, records, and the like, the next step in the *ad infinitum* process being represented by the indexes which appear every decade or so to the abstracts themselves. By no other means would the investigator be able to "read up the literature" before attacking a new problem, and though there may be two opinions as to the wisdom of so doing, there can be none as to the desirability of having the power if need be. The present volume consists of a subject index to the first twelve volumes of the *Experiment Station Record*, the well known series of abstracts of both American and European papers in agricultural science which is issued monthly by the United States Department of Agriculture, and distributed so liberally to all foreign workers. The *Experiment Station Record* is, indeed, something more than a journal of abstracts; it contains from time to time special articles resuming the current state of knowledge about particular subjects, and written by some acknowledged expert; for example, in this index we find mentioned special articles by Kühn, Stohmann, Kellner, Zuntz, and Hagemann on nutrition investigations alone.

The abstracts proper in the *Experiment Station Record* are generally very full; like all abstracts, they vary much in value, but generally they fulfil their real purpose of telling one whether it is worth while to read the original paper or not. Naturally, with a subject like agriculture, touching on so many sciences, the abstracts cover a very wide field; chemistry, botany, zoology, geology, all have their special journals which must be looked through lest any article bearing on agriculture escape; meteorology, bacteriology, veterinary science, horticulture also contribute, in addition to the great volume of journals in every country which are devoted solely to agricultural topics. The present index only adds to the debt of gratitude which all British workers in this field have long owed to the United States Department of Agriculture; in fact, if one wants to find the reference to some English experiment, by far the best if not the only way of tracing it is to hunt up its abstract in the *Experiment Station Record*. Such a pursuit will now be greatly facilitated by the present general index, which represents a putting together of the very full indexes to each of the annual volumes. A further feature of value is a complete list of *Bulletins* issued by the various divisions of the U.S. Department of Agriculture, with references to the abstracts in the *Record*. When we add that the department has also published card indexes to the more important foreign agricultural publications, as, for example, to the well known *Landw. Versuchsstationen*, we get a further idea of the completeness with which the United States Department of Agriculture is pursuing its self-imposed task of bibliography.

[1] "General Index to Experiment Station Record." Vols. i. to xii., 1889–1901. Pp. 671. U.S. Department of Agriculture. (Washington, 1903.)

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

AT the Darmstadt Technical College Mr. Clarence Feldmann has been appointed professor of electrotechnics.

PROF. W. NERNST, director of the departments of physical chemistry and electrochemistry at Göttingen, has accepted the chair at Berlin previously occupied by Prof. Landolt.

PROF. ARRHENIUS has declined the appointment offered him at Berlin, the Swedish Academy of Sciences having founded a Nobel Institute of Physical Chemistry with Prof. Arrhenius as director.

DUBLIN University has conferred the degrees of Master in Surgery and Doctor in Medicine *honoris causa* on Sir Frederick Treves, C.B., and the degree of Doctor in Science *honoris causa* on Major Ronald Ross, C.B., F.R.S.

DR. E. W. SKEATS, demonstrator in geology at the Royal College of Science, has been appointed to the chair of geology and mineralogy in the University of Melbourne in succession to Prof. J. W. Gregory, F.R.S., now professor of geology at Glasgow University.

CHAIRS for research and teaching in protozoology and in helminthology are about to be established at the London School of Tropical Medicine, the funds being provided by certain colonial Governments. The importance of these branches of research in tropical medicine is unquestionable, and it is gratifying to know that this is appreciated by the Governments which have thus assisted the study of the subjects.

DR. JOLY has been appointed ordinary professor of mathematics at Lausanne; Dr. Heinrich Liebmann, hitherto recognised teacher in mathematics, has been appointed assistant professor of philosophy at Leipzig; Dr. Roland Scholl, assistant professor of chemistry at the technical college, Carlsruhe; Dr. Arthur Wehnelt assistant professor of theoretical and applied physics at Erlangen; Dr. Georg Edler von Georgievics, hitherto professor of chemical technology at Bielitz, is to succeed Prof. Karl Zulkowski at the German Technical College at Prague.

THE annual conference of teachers, arranged by the London County Council, will be held on January 5–7 next at the Medical Examination Hall, Victoria Embankment. At the first meeting, addresses on the teaching of arithmetic will be given by Mr. C. T. Millis and Mr. S. O. Andrew, and the discussion will be opened by Mr. A. W. Siddons. Other subjects to be brought forward at subsequent meetings are:—the psychology of dictation, the teaching of reading, art teaching in Japan, the influence on handicraft of art teaching in elementary and secondary schools, the art training of the artisan, and true and false applications of Froebel's principles.

THE promoters of the movement for providing the University College of North Wales with new buildings on the site presented by the Corporation of Bangor have within the last few days been greatly encouraged in the task by an announcement that Mr. Owen Owen will contribute 1000*l.* to the building fund. This donation, taken in conjunction with the recent bequest to the college by the late Dr. Isaac Roberts of the sum which is expected to reach about 15,000*l.*, and by the late Mr. John Hughes, of Liverpool, and Mr. Richard Hughes, of Llanfwrog, Anglesey, of 5000*l.* and 1500*l.* respectively for the purpose of establishing scholarships, affords a welcome indication of the interest which is now being taken in the fortunes of the college by Welshmen having the like means and wish to benefit the cause of higher education.

AT a recent meeting with reference to Swanley Horticultural College, presided over by Lady Brassey, Mr. J. C. Medd urged the claims of the college to recognition by the Board of Agriculture, and showed how the institution now fulfilled the conditions which it ought to do, if it were to expect an annual grant from that Government department. He also alluded to the nature-study course for teachers which was held at Swanley during the summer holidays. Sir John Cockburn pointed out that all educational establishments that did their duty were in need of funds, and that Swanley College was no exception. Mr. Buckmaster, chief inspector to the Board of Education, spoke of the efficiency of Swanley College at the present time, and thought that all energy should be directed towards maintaining and improving the position which Swanley had attained rather than to inaugurating similar undertakings.

ADDRESSING the boys at St. Clement Danes' Holborn Estate Grammar School on Monday, Lord Alverstone remarked that it was the knowledge acquired in youth which lasted longest. The effort to retain impressions in later life was in marked contrast to that made when the brain was younger. Modern languages, therefore, should be earnestly and carefully studied at school. He was glad to see a considerable number of pupils had gained honours in English literature. In the hurry and race of modern life there was a tendency to advocate education which would be of immediate assistance to professional life; but he was strongly of opinion that up to the age of sixteen or seventeen a boy's education should be general, and the temptation to specialise too much should be resisted. A boy would be a better student and would make a better man

of the world if up to seventeen he received a liberal education rather than one directed to any special object. Most educationists would agree with Lord Alverstone in his objection to specialisation at school; but in connection with this subject it is pertinent to ask whether the study of Greek is not specialisation to a boy who is taught English and Latin properly.

AT the annual speech day of Scarborough Municipal School on Tuesday, the Right Hon. A. H. Dyke Acland, chairman of the governing body of the school, remarked that if he were asked what the secondary schools of the country needed most he would say more money, fewer examinations, and a more effective instruction in English language and literature. They wanted the means which would enable them to try to follow the example of other countries in the matter of secondary education. The culprit in this case was not the Board of Education but the Treasury. If it had to put down ten millions for elementary education it tried to take it out of secondary education, and at this present moment of our country's history there was nothing which needed more assistance than secondary education. With regard to examinations, Mr. Acland strongly contended that the old system of paper examinations was not a true test of the efficiency of a school, and was often altogether deceptive. The true test was when half a dozen inspectors spent four days and watched the work of the pupils, as was done at Scarborough. In America there were almost no examinations, and in Germany the ordinary paper examination of which we thought so much was unknown.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, October 27.—"Some Physical Characters of the Sodium Borates, with a New and Rapid Method for the Determination of Melting Points." By C. H. **Burgess** and A. **Holt,** jun.

The glasses obtained by fusing sodium carbonate with boric anhydride can be transformed either wholly or in part on prolonged heating into stable, crystalline varieties, which invariably melt at higher temperatures than the glasses from which they were derived.

A study of the melting points of the crystalline and vitreous forms of mixtures of different compositions leads to the conclusion that only two sodium borates can be obtained by fusion—$Na_2O.4B_2O_3$ and $Na_2O.B_2O_3$.

The addition of Na_2O to boric anhydride produces in the first place a solution of the borate $Na_2O.4B_2O_3$ in boric anhydride. This then becomes supersaturated, and the borate in excess separates on heating for some time. The amount which separates continues to increase until the mixture has the composition of nearly pure $Na_2O.4B_2O_3$, when complete crystallisation occurs. Between this point and the compound $Na_2O.B_2O_3$, the crystalline forms appear to be solid solutions of the two above mentioned borates, anhydrous borax itself being almost the eutectic point. In mixtures containing more sodium than $Na_2O.B_2O_3$, the crystals seem to be solid solutions of this compound with sodium carbonate. The glasses appear to be the superfused and metastable forms of the crystals.

Analyses of glasses and crystals of various composition confirm the observations derived from the melting points. The melting point method employed consisted essentially of a platinum wire which was heated electrically, to which a small bead of the substance under investigation was hung. A light weight was attached to the bead. When the wire was heated to the melting point of the substance the bead and weight fell off. The resistance of the wire was determined at this moment, and thence the temperature. The method proved good for substances like glass, which have hitherto not been supposed to melt at any definite temperature.

November 17.—"On the Group IV. Lines of Silicium." By Sir Norman **Lockyer,** K.C.B., LL.D., Sc.D., F.R.S., and F. E. **Baxandall,** A.R.C.Sc.

In previous communications to the Royal Society an account has been given of the behaviour of the lines of silicium under varying experimental conditions, and as a result of the inquiry the lines were divided into four distinctive groups. The genuineness of the lines of group iv., as silicium lines, has recently been questioned by M. de Gramont, of Paris. He concludes that, as the lines of group iv. always disappear from his spectra with the air lines, they are really due to oxygen or nitrogen. This is so much at variance with the Kensington conclusions that it has been considered necessary to give, in the present paper, the photographic evidence on which those conclusions were based. Reproductions of photographs of silicium spectra under various electrical conditions are given, and from the behaviour of the Si iv. lines in the different photographs it is claimed that they cannot be due to anything other than silicium.

In the vacuum-tube spectrum of SiF_4 the Si iv. lines are seen to be stronger than even the strongest of Neovius's air lines, which appear in the same spectrum.

In one of the reproductions, the spark spectrum of sodium-silico-fluoride, volatilised between platinum poles, is compared with the spark spectrum of air, also made incandescent between platinum poles. In each spectrum the ordinary lines of nitrogen and oxygen are well seen. The silicium lines in question are shown in the former spectrum, but have no corresponding lines in the air spectrum. It is also mentioned that these lines do not occur in the Kensington spark spectrum of any element other than silicium.

There are, according to Neovius, very weak lines of oxygen or nitrogen near the positions of the silicium lines (4089·1 and 4116·4). These faint air lines are possibly the lines which Gramont gets in his spectra, but from the evidence adduced in the present paper they are not the lines which appear so strongly in the Kensington silicium spectra.

In another reproduction the SiF_4 spectrum is given alongside that of ϵ Orionis, and the identity of position of the Si iv. lines and strong lines in the stellar spectrum is shown.

Linnean Society, December 1.—Prof. W. A. Herdman, F.R.S., president, in the chair.—Proteid digestion in animals and plants: Prof. S. H. **Vines,** F.R.S. In this discourse Prof. Vines first remarked that the foundation of our knowledge of gastric digestion in animals was laid by van Helmont so long ago as early in the seventeenth century ("Ortus Medicinæ," 1648), who held that it was effected by an "acid ferment." But in spite of continued research by Réaumur, Stevens, Spallanzani and others, it was not until two hundred years later that the ferment was actually detected. This important discovery was made in 1836 by the celebrated Schwann, who gave to the ferment the name "pepsin." In the course of subsequent investigation, it came to be recognised that the digestion of the food is not by any means completed in the stomach, but that the greater part of the digestive process is carried on in the small intestine (duodenum) by the pancreatic secretion. Claude Bernard ascertained in 1856 that the pancreatic juice contains a ferment that digests proteids; to this ferment the name "trypsin" was given by Kühne in 1876. These two were the only proteases known until quite recently (1901) a new protease, termed "erepsin" by Cohnheim, its discoverer, was added to the list. Like trypsin, this protease peptolyses peptones, and is active in alkaline liquids; but its peptonising power is much less marked, as it is without action on albumin and fibrin, though it can peptonise casein. The discovery of erepsin suggested the possibility that trypsin might be, not a single enzyme, as had hitherto been thought, but a mixture of enzymes, possibly of peptonising with peptolysing enzymes. Research in this direction has, in the hands of Dr. Vernon, already (1903) shown that what is generally known as trypsin is a mixture of erepsin (pancreato-erepsin) with what may be termed trypsin proper. It is not inconceivable that analysis may be carried still further, and that trypsin proper may itself be found to be a mixture of a peptonising with a peptolysing enzyme. Prof. Vines next turned to proteid-digestion in plants. His own contribution, made within the last three years, consists of a number of observations on many different plants or parts of plants, showing that a protease of some kind is probably to be found in all parts of all plants at one stage or other of their development. It appears that whilst all plants that have been investigated can effect peptolysis,